Hie-kwang-ki, 'mark of combining light.' Besides this palace in Leo and Virgo, there is another, Tien-shï-yuen, 'inclosure of the heavenly market.' It is not far to the north-east of Scorpio. It is the serpent in our astronomy. Within the brilliant circle of the serpent is a star called 'court of the western heaven.' There is also a bright star, α Herculis, which is called 'emperor's throne.' The twenty-two stars in the Serpent are named after the States into which China was formerly divided."

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Among the numerous lectures on physics and chemistry this term, we note those of Prof. Liveing, on spectroscopic chemistry; Prof. Dewar, on physical chemistry; Mr. Pattison Muir, on chemical affinity; Mr. Robinson, on agricultural chemistry; Mr. Heycock, on chemical philosophy; Prof. Thomson, on electricity and magnetism, and on the kinetic theory of gases; Mr. Shaw, on thermodynamics and radiation; and Mr. Wilberforce, on dynamo electric machines (continuous current generators and motors). Prof. Stuart lectures on theory of structures.

Prof. Foster continues his elementary course of physiology; Dr. Lea his chemical physiology; and Mr. Langley his advanced histology and physiology.

In zoology, Prof. Newton lectures on the geographical distribution of Vertebrates. Mr. Sedgwick and Mr. Darwin conduct the large class of elementary biology. Mr. Gadow's course is on the morphology of the Amniota (recent and extinct). Mr. Sedgwick, Mr. Harmer, and Mr. Weldon continue their classes on the Invertebrata.

Mr. Darwin lectures on the physiology of plants (advanced), Mr. Gardiner has a general elementary course, Mr. Vaizey lectures on the morphology and classification of Cryptogams, and Dr. Hicks on elementary botany.

The lectures on geology are divided thus: Prof. Hughes, geology of a district to be visited at Easter; Mr. Marr, principles, and geology and scenery; Mr. Harker, petrology; Mr. Roberts, palæontology; Mr. Seward, palæobotany.

The principal mathematical lectures are the following: Prof. Stokes, semi-convergent series involving powers of a complex variable; Prof. Cayley, analytical geometry; Prof. Adams, lunar theory; Mr. Pendlebury, projective geometry; Mr. Glazebrook, hydrodynamics (waves and sound); Mr. Hobson, spherical and cylindrical harmonics; Mr. Larmor, geometrical optics and electro-magnetism; Mr. Forsyth, modern algebra (binary forms); Dr. Ferrers, elliptic functions; Dr. Besant, analysis; Mr. H. M. Taylor, higher plane curves; Mr. Webb, dynamics (elasticity and viscosity); Mr. Stearn, hydrodynamics (multiply-connected velocity-potentials and vortices); Mr. Herman, hydrodynamics (viscous and gravitating fluids).

An examination will be held at Gonville and Caius College on March 15 for one Shuttleworth Scholarship, value £60 per annum for three years. Candidates must be medical students of the University of not less than eight terms standing. In the case of candidates not already scholars of the College, the examiners may recommend at the same time for a foundation scholarship. Further particulars may be obtained from the tutors.

SCIENTIFIC SERIALS.

American Journal of Science, January.—The history of a doctrine, by S. P. Langley. This is the address delivered last year to the American Association for the Advancement of Science, here published complete with the notes that have not hitherto appeared. Its object is to show the steady progress of scientific truth, as illustrated by the history of the undulatory and corpuscular theories of light from the time of Descartes, Boyle, and other precursors of Newton down to the present day, when the identity of radiant light and heat as forms of motion, or as different effects of radiant energy, has been finally established.—Description of the new mineral beryllonite, by Edward S. Dana and Horace L. Wells. This is a new phosphate of sodium and beryllium discovered in 1886 by Mr. Sumner Andrews near Stoneham, Maine, the same district that has already yielded fine specimens of phenacite, herderite, and other rare minerals. It occurs mostly as a crystal in a fragmentary state, of small size and seldom well formed, but remarkable for the number of planes they present, eight or more distinct planes being frequently presented in each zone on a single crystal. Twins are common, leading to many curious variations of form. The crystals are colourless, or slightly yellowish, and transparent, with specific gravity 2·845, and hardness 5·5.—The iron ores of the Penokee-Gogebic series of Michigan and Wisconsin, by C. R. Van Hise. The author's recent explorations of this region confirm Prof. Irving's conclusion that the original rock of the iron-bearing formation is a cherty iron carbonate from which the various phases of rock and the ore found in it have been produced by a complex series of alterations. The iron ore is a soft, red, somewhat hydrated hæmatite, more or less manganiferous, and mostly very friable.—A quartz-keratophyre from Pigeon Point and Irving's augite-syenites, by W. S. Bayley. The remarkable bright red rock of Pigeon Point, Minnesota, is here studied in its various phases, with the general result that the sections described by Irving as augite-syenites are partly identical with the typical red rock itself, and partly the same in all essentials as the formations which have been called its intermediate varieties. The space between the fresh olivine-gabbro and the typical quartz-keratophyre is occupied by a series of rocks exhibiting a gradual transition between the heavy dark basic rock and the light red keratophyre.—On the occurrence of hanksite in California, by Henry G. Hanks. This anhydrous sulphate of soda has hitherto been found in limited quantities amongst the various borax fields of California. But the author's researches tend to show that it exists in great abundance, and that it plays an important part in the metamorphoses that produce gay-lussite, thinolite, and perhaps borax.—Further papers on Mount Loa are contributed by James D. Dana and the Rev. E. P. Baker, bringing its history down to July 1888.—H. L. Wells and S. L. Penfield contribute notes on the new mineral sperrylite.

American Journal of Mathematics, vol. xi. No. 2 (Baltimore, January 1889).—The number opens with an instalment of a memoir entitled "Remarque au sujet du théorème d'Euclide sur l'infinité du nombre des nombres premiers," by J. Perott (pp. 99–138). A footnote supplies bibliographical information as to previous memoirs on the same subject.—Next, Prof. Cayley writes on "The Theory of Groups" (pp. 139–57), a subject he has pretty largely written upon before, and to which his attention has been recalled by the section, in Mr. Kempe's Philosophical Transactions memoir "On the Theory of Mathematical Form," entitled "Groups containing from One to Twelve Units." The paper is largely illustrated by what the author styles "colour groups."—Mr. A. E. H. Love discusses "Vortex Motion in certain Triangles" (pp. 158–71), by a method explained by Dr. Routh in a paper in vol. xii. of the London Mathematical Society's Proceedings.—Another hydrodynamical paper follows, by Mr. Basset, "On the Steady Motion of an Annular Mass of Rotating Liquid" (pp. 172–81), wherein he follows up previous work in the line of Poincaré's and Prof. G. H. Darwin's recent investigations of the figures of equilibrium of rotating masses of liquid. The case considered is for an approximately circular cross-section and for rotation under the influence of its own attraction about an axis through its centre of inertia, which is perpendicular to the plane of its central line.—A paper, by Sophus Lie, "Die begriffe Gruppe und invariante" (pp. 182–86), is reprinted from the *Berichte der k. Sächs Gesellschaft der Wissenschaften*, August 1887.—A short note, by E. Picard, "Sur les formes quadratiques binaires a indéterminées conjuguées et les fonctions fuchsiennes" (pp. 187–94), closes the number. The method employed is that used by Poincaré in his memoir on fuchsian functions (*Journal de Jordan*, 1887).

SOCIETIES AND ACADEMIES.

LONDON.

Royal Meteorological Society, January 16.—Dr. W. Marcet, F.R.S., President, in the chair.—The Report of the Council showed that a large amount of work had been done during the past year, and that considerable progress had been made in the investigation of one of the most interesting and hitherto neglected branches of meteorology, viz. thunderstorms. Forty-nine new Fellows were elected last year, the total number on the books now being 525.—After the Report had been adopted, the President delivered an address on "Fogs," which he illustrated by a number of interesting lantern slides. Fogs and clouds are one and the same thing. A cloud is a fog when entered into, and a fog seen from a distance, suspended in the air, becomes a cloud. After describing the various kinds of fog—*e.g.* river, sea, Newfoundland, radiation, town, &c., fogs—Dr. Marcet referred to London fogs. Dr. Tyndall has accounted for them by assuming each particle of condensed vapour to be covered by coal-smoke. These fogs usually accompany a high barometer, and are frequently dry in their character. It is a well-known fact that cold air on the tops of hills, being heavier than the air below, slides down the slopes, so that the lower parts of the hill-sides are actually colder than the plains at some distance from the hills. Now, London, in the Thames Valley, is surrounded by hills—to the north, Highgate, Hampstead, and Harrow; in a westerly direction, Putney and Wimbledon; and in a more southerly direction, Clapham and Sydenham. The air is colder on these hills than in London with its millions of inhabitants, its coal-fires and factories, hence it is heavier, and will have a great tendency to slide down the hills towards the town and the river. Should the air in town be on the point of saturation, and the cold air from above saturated with vapour, it is obvious that the increased cold from above will produce a precipitation of moisture, and it will come to pass that a fog is produced. If the hill-tops be not only colder than the air below, but enveloped in a fog, it stands to reason that the fog below will be all the denser, and especially in the neighbourhood of water, such as the River Thames and the ornamental waters in the parks.—The following gentlemen were elected the officers and Council for the ensuing year:—President: Dr. Wm. Marcet, F.R.S. Vice-Presidents: Francis Campbell Bayard, Henry Francis Blanford, F.R.S., William Ellis, Richard Inwards. Treasurer: Henry Perigal. Trustees: Hon. Francis Albert Rollo Russell, Stephen William Silver. Secretaries: George James Symons, F.R.S., Dr. John William Tripe. Foreign Secretary: Robert Henry Scott, F.R.S. Council: Edmund Douglas Archibald, William Morris Beaufort, Arthur Brewin, George Chatterton, William Henry Dines, Frederic Bernard Edmonds, Charles Harding, Baldwin Latham, Capt. John Pearse Maclear, R.N., Edward Mawley, Henry Southall, Dr. Charles Theodore Williams.

Zoological Society, January 15.—Prof. Flower, F.R.S., President, in the chair.—The Secretary read a report on the additions that had been made to the Society's Menagerie during the month of December 18 8, and called attention to the young Chimpanzee purchased of Mr. Cross, of Liverpool, on December 6 (see NATURE of January 10, p. 254).—A letter was read from Heer F. E. Blaauw, of Amsterdam, containing an account of the development of the horns of the White-tailed Gnu as observed in specimens bred in his menagerie.—Prof. Newton exhibited a specimen of *Pennula millsi*, Dole, brought from the Sandwich Islands by Mr. S. B. Wilson, remarking that it seemed to be identical specifically with *Rallus obscurus*, Gmelin, a species which has not been lately recognized.—Prof. Bell made some remarks on the question of the food of *Bipalium*.—Canon Tristram made some remarks on a specimen of *Emberiza cioides*, a Bunting of Siberia, of which a specimen was believed to have been obtained in this country at Flamborough in October 1887.—Prof. F. Jeffrey Bell read a note on the Echinoderm fauna of the Bay of Bengal.—Mr. F. E. Beddard and Mr. Frederick Treves gave an account of the anatomy of the Sumatran Rhinoceros as observed in two specimens of this animal that had lately died in the Society's Gardens. The muscular anatomy of the limbs of this Rhinoceros was especially treated of.—Prof. Newton read a paper on the breeding of the Seriema (*Cariama cristata*) in the Society's Gardens.

Entomological Society, January 16.—Fifty-sixth Anniversary Meeting.—Dr. D. Sharp, President, in the chair.—An abstract of the Treasurer's accounts, showing a balance in the Society's favour, was read by Mr. Osbert Salvin, F.R.S., one of the auditors; and Mr. H. Goss read the Report of the Council. It was announced that the following gentlemen had been elected as officers and Council for 1889:—President: The Right Hon. Lord Walsingham, F.R.S. Treasurer: Mr. Edward Saunders. Secretaries: Mr. Herbert Goss and the Rev. Canon Fowler. Librarian: Mr. Ferdinand Grut. And as other members of Council, Mr. Henry W. Bates, F.R.S., Capt. H. J. Elwes, Mr. William H. B. Fletcher, Mr. F. DuCane Godman, F.R.S., Prof. Raphael Meldola, F.R.S., Dr. P. B. Mason, Mr. Osbert Salvin, F.R.S., and Dr. D. Sharp.—Dr. Sharp, the outgoing President, then delivered an address, for which a vote of thanks to him was moved by Capt. Elwes, seconded by Mr. Salvin, and carried. A vote of thanks to the Treasurer, Secretaries, and Librarian was moved by Mr. J. W. Dunning, seconded by Lord Walsingham, and carried. Mr. Saunders, Mr. Goss, and Mr. Grut severally replied.

PARIS.

Academy of Sciences, January 7.—M. Janssen in the chair.—On the Lindstedt series, by M. H. Poincaré. Although these series are not convergent in the strict sense of the word, they are often very useful in astronomical calculations owing to the rapidity with which the terms decrease. Here M. Lindstedt's method is presented from a fresh standpoint, and brought into connection with the principles expounded in Jacobi's "Vorlesungen über Dynamik."—On the reactions between chromic acid and oxygenated water, by M. Berthelot. This peculiar reaction has acquired a fresh interest since M. Ad. Carnot's recent discovery of an ingenious method for effecting the quantitative analysis of chromic acid by means of oxygenated water, and reciprocally, with simultaneous reduction of both compounds. The analogy of the reaction with that of permanganic acid has induced M. Berthelot to repeat the experiments, with the result that this, like other reactions of oxygenated water, may now be interpreted by the laws of thermo-chemistry.—On an hydraulic machine constructed in England, by M. Anatole de Caligny. The reference is to Mr. Pearsall's apparatus, in which M. de Caligny's open tube is replaced by a chamber allowing the air to escape freely.—Observations made on the summit of Mont Ventoux on the calorific intensity of solar radiation, by MM. A. Crova and Houdaille. The object of these observations has been to ascertain whether, at an altitude of 1900 metres, solar radiation undergoes daily variations analogous to those recorded at Montpellier, and whether from the curves registered at the higher elevation a value may be deduced for the solar constant more exact than those obtained from the calculation of the curves traced at sea-level. It results from these researches that at the altitude of 1900 metres the solar constant may acquire a value very close to the 3 calories obtained by Mr. Langley from his observations on Mount Whitney. The polarization of the blue light of the sky was also studied by means of M. Cornu's photopolarimeter, and its spectrum analysis made with M. Crova's spectrophotometer modified for the purpose. The polarization appears in general to increase with the solar constant, thus furnishing useful data for determining the degree of calorific transparency in the atmosphere.—On the true and mixed butylic ethers, by M. E. Reboul. Theory anticipates ten of these compounds; but two only are known, the normal diprimary butylic ether of Lieben and Rossi, and Kessel's di-secondary. Williamson's general method having mostly failed, or yielded only doubtful results, M. Reboul has attempted by the process here described to complete the whole series. He has so far obtained five, not yet described, which with the two already known leave three to be still procured under other conditions.—On M. Hirn's new work, entitled "Constitution de l'Espace céleste," by M. Faye. This important work deals with the question of an ether or subtle medium filling all space, as postulated by physicists to explain the phenomena of light, heat, and electricity, but the presence of which astronomers have failed to detect as a resisting medium in the movements of the heavenly bodies. With a view to putting this seeming contradiction in a clear light, M. Hirn has worked out some delicate calculations which have led to several remarkable and at times wholly unexpected conclusions. Thus in estimating the density of a new medium capable by its resistance of causing a secular acceleration of half a second in the mean velocity of the moon, he finds that such a density would correspond with a kilogramme of matter uniformly diffused throughout a space of about 390,000 square miles. This is a density one million times rarer than that of the air reduced to one millionth of its normal density in Mr. Crookes's ingenious apparatus.—On the perturbations of the planet Hestia (46), according to the theory of M. Gyldén, by M. Brendel. The application of M. Gyldén's theory of perturbations to this planet shows that it is subject to some very considerable disturbances, its mean motion being about three times that of Jupiter.—On a process by which diurnal nutation may be demonstrated, and its constants determined, by M. Folie. This extremely simple process consists in observing at intervals of six hours two stars distant not more than 3′ from the Pole.—On the quantitative analysis of organic nitrogen by the Kjeldahl method, by M. L. L'Hote. This new method is here subjected to a thorough test, and is found to yield results greatly inferior in accuracy to those obtained from the old process by means of sodaic lime.—On the early and late varieties of beetroot, by MM. C. Viollette and F. Desprez. The early maturing plant, although yielding the largest proportion of sugar, is in other respects subject to many drawbacks preventing its general adoption by growers. A series of experiments here described show that a late variety may be obtained, which, while free from these disadvantages, yields an abundant supply of sugar.—M. Hermite has been unanimously elected Vice-President, and MM. Becquerel and Fremy members of the Central Administrative Committee, for the current year. In the present number is also published the list of the members of the Academy on January 1, 1889. The following are the English and American corresponding members:—*Geometry:* James Joseph Sylvester, George Salmon. *Astronomy:* John Russell Hind, J. C. Adams, Arthur Cayley, Joseph Norman Lockyer, William Huggins, Simon Newcomb, Asaph Hall, Warren De La Rue, Benjamin Althorp Gould, Samuel Langley. *Geography and Navigation:* Admiral G. H. Richards. *General Physics:* James Prescott Joule, George Gabriel Stokes. *Chemistry:* Edward Frankland, Alexander William Williamson. *Mineralogy:* James Hall, Joseph Prestwich. *Botany:* Joseph Dalton Hooker, Maxwell Tylden Masters. *Rural Economy:* Sir John Bennet Lawes, Joseph Henry Gilbert. *Anatomy and Zoology:* James Dwight Dana, Thomas Henry Huxley. *Medicine and Surgery:* Sir James Paget. Foreign Associates: Sir Richard Owen, Sir George Biddell Airy, Sir William Thomson.

January 14.—M. Des Cloizeaux in the chair.—On the solar statistics of the year 1888, by M. R. Wolf. From the various solar and magnetic observations made at the Observatories of Zurich and Milan, M. Wolf has by his well-known method deduced and tabulated for last year the mean monthly values for the relative number r, for the variations in declination v, and for the increase Δr and Δv that these quantities have received since the corresponding epochs of the year 1887. It results from these tables that both the relative number and the magnetic variation have continued to diminish, and that it is probable the minimum has now been nearly reached. It also appears that the slight anomalies recorded during the previous year have disappeared, and that the parallelism between these two series has been almost completely re-established.—Mode of diffusion of the voltaic currents in the human organism, by M. L. Danion. From the series of experiments here described it appears that, excepting the skin and bones, the various tissues and substances constituting the organism have practically the same electric conductibility. The skin is in general highly resisting, while the conductibility of the bones, which alone affect the diffusion of the current, is perceptibly less than two-fifths of that of the other hypodermic tissues. Under like conditions the diffused intra-polar and extra-polar intensities have the same value. Contrary to the universal opinion, the choice and combination of electrodes of various dimensions does not perceptibly modify the effects of hypodermic electrization. The experiments made on animals and on man confirm those carried out on homogeneous liquid masses, while at the same time showing the extreme diffusion of the voltaic currents, hence the deductions drawn from the latter order of experiments are applicable to the electrization of the animal organism.—Observations of Faye's comet, made at the Observatory of Algiers with the 0·50 m. telescope, by MM. Trépied, Rambaud, and Sy. These observations cover the period from December 28 to January 5.—On the influence of the shock on the permanent magnetism of nickel, by M. G. Berson. These experiments form a supplement to those lately made by the author with a bar of steel. The various phenomena are in both cases strictly analogous, tending to show that with a field of feeble intensity a bar of either metal may be permanently magnetized, provided the shocks be given while the bar is within the field. The vibrations of the apparatus furnished with permanent magnets should also be carefully avoided, as they tend rapidly to diminish the force of the magnetic momentum.—On the oxidation and scouring of tin, by M. Léo Vignon. In a previous communication (*Comptes rendus*, November 5, 1888) the author showed that crystallized tin, deposited by the action of zinc and of the chemically neutral solutions of the stannous or stannic chlorides, is capable of high oxidation, and also when heated in contact with the air presents the curious property of combining with oxygen without melting, but burning like tinder (*amadou*). His further experiments with this partially oxidized tin have disclosed several facts, which explain the phenomena already described, and at the same time supply the elements of the theory on which depend the common industrial operations known as tinning and tin-soldering. In general it may be concluded that tin is capable of considerable oxidation in a dry or moist atmosphere, a conclusion which agrees with the comparative data already obtained on the heats of formation of the metallic oxides.—On ergosterine, a new immediate principle of the ergot (spur) of rye, by M. C. Tanret. The ergot of rye contains a crystallized substance, which closely resembles, and may readily be confounded with, cholesterine. But the careful study made by M. Tanret of this fungus shows that it differs in its composition both from animal cholesterine and its isomerous vegetable substances. This new principle is accordingly here described and analyzed under the name of ergosterine. Its composition may be represented by the formula—

$$C_{52}H_{40}O_2, H_2O_2.$$

It crystallizes in alcohol in the form of little pearly pellets, and in ether in that of sharp needles, and is quite insoluble in water. Like cholesterine, it is a monatomic alcohol, as appears from the analysis of its formic, acetic, and butyric ethers.—Papers are contributed by M. Hugo Gyldén, on the elementary terms in the co-ordinates of a planet; by M. Maquenne, on the heptine of a perseite; by MM. Ed. Heckel and Fr. Schlagdenhauffen, on the chemical constitution and industrial value of the gutta yielded by *Bassia latifolia*; and by M. Hueppe, on the virulence of cholera parasites.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

Annuaire de l'Académie de Belgique, 1889 (Bruxelles).—Longmans' School Arithmetic with Answers: F. E. Marshall and J. W. Welsford (Longmans).—Biologia Centrali-Americana (Botany): W. B. Hemsley and Sir J. D. Hooker.—Hulfstabellen zur Mikroscopischen Mineralbestimmung in Gesteinen: H. Rosenbusch (Stuttgart, Koch).—Les Minéraux des Roches: A. M. Lévy and A. Lacroix (Paris, Baudry).—A Course of Easy Arithmetical Examples for Beginners: J. G. Bradshaw (Macmillan).—Solutions of the Examples in a Treatise on Algebra: C. Smith (Macmillan).—Calendar and General Directory of the Department of Science and Art for the Year 1889 (Eyre and Spottiswoode).—A Monograph of the British Uredineæ and Ustilagineæ: C. B. Plowright (Kegan Paul).—Graphics, or the Art of Calculation by Drawing Lines, Part 1: R. H. Smith (Longmans).

CONTENTS.

PAGE
Mr. Grant Allen's Notions about Force and Energy. By **Prof. O. J. Lodge, F.R.S.** 289
Rocks and Soils. By **Prof. John Wrightson** . . . 292
Our Book Shelf:—
  Wardrop: "The Kingdom of Georgia" 293
  "The British Journal Photographic Almanac for 1889" 293
  "The Photographer's Diary and Desk-book for 1889" 294
Letters to the Editor:—
  The Climate of Siberia in the Mammoth Age.—**Henry H. Howorth, M.P.** 294
  The Crystallization of Lake Ice.—**Thomas H. Holland** 295
  Use of the *Remora* in Fishing.—**Dr. P. L. Sclater, F.R.S.** 295
  A Remarkable Rime.—**M. H. Maw** 295
Human Variety. By **Francis Galton, F.R.S.** . . . 296
Supposed Fossils from the Southern Highlands . . 300
The Law of Storms in China. (*Illustrated.*) By **Dr. W. Doberck** 301
The State of Vesuvius. By **Dr. H. J. Johnston-Lavis** 302
Volcanic Sea Wave. By **Captain W. J. L. Wharton, R.N., F.R.S.** 303
Notes 304
Our Astronomical Column:—
  Discovery of a New Comet 307
  Minor Planets 307
  The Observatory of Tokio 307
Astronomical Phenomena for the Week 1889 January 27—February 2 307
Geographical Notes 307
Electrical Notes 308
Star Names amongst the Ancient Chinese. By **Dr. Joseph Edkins** 309
University and Educational Intelligence 310
Scientific Serials 310
Societies and Academies 310
Books, Pamphlets, and Serials Received 310